$K^*(1680)$

$I(J^P) = \frac{1}{2}(1^-)$

$K^*(1680)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
1718±18 OUR AVERAGE						
$1722 \pm 20^{+33}_{-109}$	4289	[1] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
$1677 \pm 10 \pm 32$		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
$1735 \pm 10 \pm 20$		ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
1678 ± 64		BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
1800 ± 70		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
~ 1650		ESTABROOKS	78	ASPK	0	13 $K^\pm p \to K^\pm \pi^\pm n$

[1] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.5 σ.

$K^*(1680)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	CHG	COMMENT
320±110 OUR AVERAGE		Error includes scale factor of 4.2.				
$354 \pm 75^{+140}_{-181}$	4289	[2] AAIJ	17C	LHCB		$B^+ \to J/\psi \phi K^+$
$205 \pm 16 \pm 34$		ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$
$423 \pm 18 \pm 30$		ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
• • • We do not use the following data for averages, fits, limits, etc. • • •						
454 ± 270		BIRD	89	LASS	−	11 $K^- p \to \overline{K}^0 \pi^- p$
170 ± 30		ETKIN	80	MPS	0	6 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$
250 to 300		ESTABROOKS	78	ASPK	0	13 $K^\pm p \to K^\pm \pi^\pm n$

[2] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.5 σ.

$K^*(1680)$ DECAY MODES

	Mode	Fraction (Γ_i/Γ)
Γ_1	$K\pi$	(38.7 ± 2.5) %
Γ_2	$K\rho$	$(31.4^{+5.0}_{-2.1})$ %
Γ_3	$K^*(892)\pi$	$(29.9^{+2.2}_{-5.0})$ %
Γ_4	$K\phi$	seen
Γ_5	$K\eta$	$(1.4^{+1.0}_{-0.8})$ %

CONSTRAINED FIT INFORMATION

An overall fit to 4 branching ratios uses 4 measurements and one constraint to determine 3 parameters. The overall fit has a $\chi^2 =$ 2.9 for 2 degrees of freedom.

The following *off-diagonal* array elements are the correlation coefficients $\left\langle \delta x_i \delta x_j \right\rangle / (\delta x_i \cdot \delta x_j)$, in percent, from the fit to the branching fractions, $x_i \equiv \Gamma_i/\Gamma_{total}$. The fit constrains the x_i whose labels appear in this array to sum to one.

x_2	−36	
x_3	−39	−72
	x_1	x_2

$K^*(1680)$ BRANCHING RATIOS

$\Gamma(K\pi)/\Gamma_{total}$ — Γ_1/Γ

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
0.387±0.026 OUR FIT					
0.388±0.014±0.022	ASTON	88	LASS	0	11 $K^- p \to K^- \pi^+ n$

$\Gamma(K\pi)/\Gamma(K^*(892)\pi)$ — Γ_1/Γ_3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$1.30^{+0.23}_{-0.14}$ OUR FIT					
2.8 ±1.1	ASTON	84	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\rho)/\Gamma(K\pi)$ — Γ_2/Γ_1

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$0.81^{+0.14}_{-0.09}$ OUR FIT					
1.2 ±0.4	ASTON	84	LASS	0	11 $K^- p \to \overline{K}^0 2\pi n$

$\Gamma(K\rho)/\Gamma(K^*(892)\pi)$ — Γ_2/Γ_3

VALUE	DOCUMENT ID		TECN	CHG	COMMENT
$1.05^{+0.27}_{-0.11}$ OUR FIT					
$0.97\pm0.09^{+0.30}_{-0.10}$	ASTON	87	LASS	0	11 $K^- p \to \overline{K}^0 \pi^+ \pi^- n$

$\Gamma(K\phi)/\Gamma_{total}$ — Γ_4/Γ

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	24k	[3] AAIJ	21E	LHCB	$B^+ \to J/\psi \phi K^+$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
seen	4289	[4,5] AAIJ	17C	LHCB	$B^+ \to J/\psi \phi K^+$

[3] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 4.7 σ.
[4] From an amplitude analysis of the decay $B^+ \to J/\psi \phi K^+$ with a significance of 8.5 σ.
[5] Superseded by AAIJ 21E.

$\Gamma(K\eta)/\Gamma(K\pi)$ — Γ_5/Γ_1

VALUE	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
$0.037\pm0.007^{+0.024}_{-0.018}$	116k	[6] CHEN	20A	BELL	$D^0 \to K^-\pi^+\eta$

[6] CHEN 20A quotes the ratio $\Gamma(K^*(1680)^- \to K^-\eta)/\Gamma(K^*(1680)^- \to K^-\pi^0)$ $=0.11 \pm 0.02^{+0.06}_{-0.04} \pm 0.04(\mathrm{B_{PDG}})$ where the last uncertainty comes from $\mathrm{B}(\eta \to \gamma\gamma) = (39.41 \pm 0.20)\%$. We divide it by 3 taking into account that $\Gamma(K^*(1680)^- \to K^-\pi^0)/\Gamma(K^*(1680)^- \to (K\pi)^-) = 1/3$.

$\Gamma(K\eta)/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE (units 10^{-2})	*EVTS*	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$1.44\pm0.21^{+0.96}_{-0.73}$	116k	[7] CHEN	20A	BELL	$D^0 \to K^-\pi^+\eta$

[7] From an amplitude analysis of the decay $D^0 \to K^-\pi^+\eta$ with a significance of 16 σ. Not independent of the CHEN 20A measurement of $\Gamma(K^*(1680) \to K\eta)/\Gamma(K^*(1680) \to K\pi)$.

$K^*(1680)$ REFERENCES

AAIJ	21E	PRL 127 082001	R. Aaij *et al.*	(LHCb Collab.)
CHEN	20A	PR D102 012002	Y.Q. Chen *et al.*	(BELLE Collab.)
AAIJ	17C	PRL 118 022003	R. Aaij *et al.*	(LHCb Collab.)
Also		PR D95 012002	R. Aaij *et al.*	(LHCb Collab.)
BIRD	89	SLAC-332	P.F. Bird	(SLAC)
ASTON	88	NP B296 493	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
ASTON	87	NP B292 693	D. Aston *et al.*	(SLAC, NAGO, CINC, INUS)
ASTON	84	PL 149B 258	D. Aston *et al.*	(SLAC, CARL, OTTA) JP
ETKIN	80	PR D22 42	A. Etkin *et al.*	(BNL, CUNY) JP
ESTABROOKS	78	NP B133 490	P.G. Estabrooks *et al.*	(MCGI, CARL, DURH+) JP